



Public-Private Transportation Initiatives Legislative Oversight Committee

Report to the Legislature Annual Report

**Prepared for the
Legislative Oversight Committee**

**Senator Bob Oke, Chair
Senator Betti Sheldon
Representative Mark Miloscia
Representative Tom Mielke**

**By the
Washington State Department of Transportation
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Introduction

Executive Summary

In 1993, the Public Private Initiatives in Transportation Act (PPI), HB 1006, was enacted into law (RCW 47.46). This law created authority for the Washington State Department of Transportation (WSDOT) to solicit proposals from private companies to plan, design, finance, construct, and operate transportation facilities, and to impose user fees or tolls to cover costs. The PPI also allowed WSDOT to use design-build as an alternative contracting technique to WSDOT's usual design-bid-build process for project delivery.

The 2002 PPI amendment established a Legislative Oversight Committee (LOC) to provide accountability of the projects under the program. This committee is comprised of one legislator from each caucus of each chamber of the legislature. The role of the Legislative oversight committee is to monitor and report on the progress, execution, and efficiency of design-build contracts issued under the PPI program.

WSDOT's Tacoma Narrows Bridge (TNB) project is currently the only design-build project that exists under the PPI Act. In accordance with RCW 47.46.180 this report will look at the accomplishments achieved in the project through 2003.

To date, the TNB project is delivering a quality product that is on schedule and within budget. The early experience with the TNB project shows design-build as an effective and efficient method of project delivery.

Background

In 1994, WSDOT created a program to implement the PPI Act and issued a Request for Proposals that invited private firms to submit projects for consideration. Six projects, including the TNB project, were selected and approved by the Transportation Commission for further consideration. Figure 1 on the following page highlights the chronology of the six PPI projects.

Figure 1. Public-Private Initiatives Chronology

1993 – In 1993 the Public Private Initiatives in Transportation (PPI), HB 1006, was enacted into law (RCW 47.46). The outcome was fourteen proposals upon which the following six projects were selected and approved by the Transportation Commission for further consideration:

- SR 18 Corridor between I-5 and I-90
- Puget Sound Congestion Pricing project
- King County Park and Ride lot improvements
- SR 520 including the Evergreen Point Bridge
- SR 522 from Woodinville to Monroe
- SR 16 / Tacoma Narrows Bridge (TNB)

1994 – The SR 18 Corridor project was dropped from consideration due to lack of public involvement and support.

1995 – The Secretary of Transportation was directed to not implement the Puget Sound Congestion Pricing Project without prior approval of the Legislature, so this project was not considered. An advisory vote was required on projects that were challenged by at least 5,000 signatures.

1996 – PPI law was amended to require legislative funding to conduct public and feasibility studies. The SR 520 and SR 522 projects were suspended due to lack of funding. The SR 16 Tacoma Narrows Project received over \$11 million in appropriations.

1997 – King County Executives decided not to advance the King County Park and Ride lot improvements to the second stage due to concerns about imposing a parking fee and concerns about debt financing for capital improvements. The Tacoma Narrows Bridge Project became the only considered PPI project.

1999 – The State Legislature authorized \$50 million in state funding for the Tacoma Narrows Bridge Project. WSDOT entered into a contract with United Infrastructure of Washington (UIW) to develop the project.

2000 – The Tacoma Narrows Bridge project was brought to a halt due to a Washington State Supreme Court ruling that WSDOT lacked statutory authority to impose tolls on the existing Tacoma Narrows Bridge.

2002 – Legislation was enacted that allowed tolling of the existing TNB as long as state-issued bonds and public financing were utilized and established the Legislative Oversight Committee.

Design-Bid-Build vs. Design-Build Contracting Methods

Design-Bid-Build Contracting

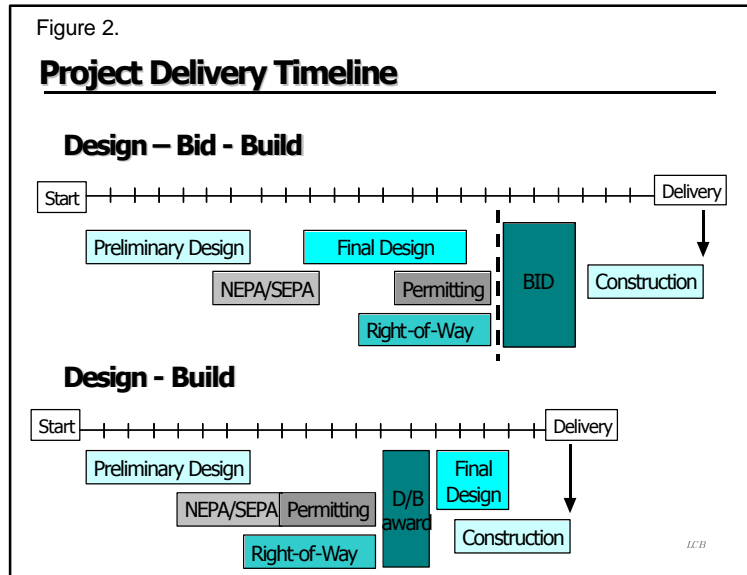
WSDOT's traditional contracting method is called design-bid-build. In design-bid-build, the design and construction processes are linear – the design is completed prior to the award of the construction contract, and is completed independent of the construction contract. In addition, right-of-way procurement, environmental permits, local agency agreements, and utility agreements are all either very well defined or in place prior to awarding the construction contract.

Design-Build Contracting

The design-build contracting method is considered an alternative method because it allows for both project design and construction to occur under one contract. Design-build contracts can take on many forms, but the key element is a single source of responsibility for the owner (WSDOT) through one contract for both design and construction. In design-build, WSDOT selects one company, or a group of companies working together, to fulfill contractual requirements for the entire project under a single contract.

In a design-build contract, preliminary design, right-of-way procurement, environmental permits, and local agency agreements are usually still completed prior to contract award. However, the final design is the responsibility of the design-builder rather than WSDOT. A design-build

contractor will often begin constructing a project before the project design is complete, and the design-builder assumes any risk associated with that simultaneous work. Risk can include unforeseen costs associated with project materials, delays associated with weather, labor relations, site conditions, or any number of other issues a contractor faces when designing and



building a project. Figure 2 above graphically represents typical project delivery timelines of design-bid-build and design-build projects.

Advantages of Design-Build

Design-build contracting is gaining favor for public sector project delivery because it promises innovative approaches that can lead to greater efficiencies in project delivery. The main advantages of design-build contracts are:

- Faster project delivery due to simultaneous design and construction;
- Reduced conflicts with project owners since the design-builder is responsible for all issues associated with design and construction;
- Reduced numbers of claims and change orders, helping reduce project cost growth; and
- Smaller owner workforce needed to administer the project since the owner is responsible only for project oversight.

Disadvantages of Design-Build

Design-build is not a panacea for all contracting challenges. Limitations to design-build contracting include:

- Funding for all phases of work must be available at the beginning of the project;
- WSDOT has less control over project details because the end product is negotiated at the beginning of the contract, and the design-builder is given authority to make decisions on how to achieve the end product.
- The design-builder has the freedom to maximize design efficiencies in the most cost-efficient way as long as performance and technical requirements are met. This is in contrast to design-bid-build, in which WSDOT directs the project design and has full control of the project outcome;
- The transfer of project risk from WSDOT to the design-builder is reflected in higher contingencies in the contract price;
- Because design and construction occur simultaneously, the final product may not be defined when construction begins; and
- If the public and interest groups are dissatisfied with the final design once it is completed, it is more costly for WSDOT to modify the final design.

Tacoma Narrows Bridge Project under Design-Build

Initially, WSDOT contracted with private-developer United Infrastructure of Washington (UIW) to finance, design, and construct the new Tacoma Narrows Bridge and associated toll facilities, and to operate toll collections. Tacoma Narrows Constructors (TNC), a joint venture of Bechtel and Kiewit Construction, was hired by UIW to design and construct the project.

The 2002 amendment to the original PPI legislation provided authority to publicly finance the Tacoma Narrows Bridge project with state-issued bonds to be paid back with tolls. WSDOT was authorized to issue up to \$800 million in state bonds to finance the TNB Project. Because of the new public financing requirement, WSDOT's agreement with UIW was terminated. WSDOT took over the project and renegotiated the agreement with TNC.

Usually, in a design-build procurement process, an owner issues a Request for Proposal (RFP) and evaluates proposals to select a design-builder. With the TNB project, the RFP process occurred during UIW's tenure as the developer and financier of the project. The 2002 amendment to the PPI Act allowed WSDOT to continue with proposals that had been previously selected, and did not require a new procurement process before WSDOT could enter into a Design-Build Agreement with Tacoma Narrows Constructors. WSDOT renegotiated and assumed the design-build agreement with Tacoma Narrows Constructors that had been originally written while UIW was the project developer for the design and construction of the new Tacoma Narrows Bridge, including improvements to mainline SR 16 approaching the bridge and the toll plaza. WSDOT executed a separate contract for the toll system supply and installation with Transcore, L.P., which had also been selected by UIW after an RFP process. On September 25, 2002 WSDOT provided a "Notice to Proceed" to both TNC and Transcore.

As a result of the design-build method the TNB project is experiencing a shortened project delivery time (this advantage is explored in more depth in this report's Efficiency section on page 13). However, since all the design details were not complete prior to construction WSDOT has had difficulty in conveying to the public several of the details of the final product.

TNC is the single point of responsibility for design and construction. They manage and resolve constructability issues that WSDOT would traditionally be responsible for in a design-bid-build project.

WSDOT's workforce needed to administer the project is much smaller than what would be needed to deliver this project using the design-bid-build model since WSDOT is responsible only for project oversight.

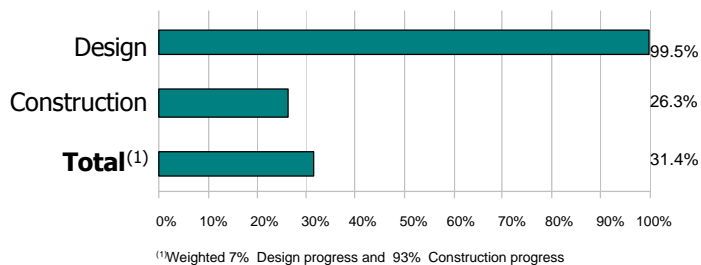
In a few areas, the final design, while meeting WSDOT performance and technical requirements has not yet met public expectations. Project landscaping is one such issue. Although the final design met WSDOT's contract specifications for landscaping, the local community asked WSDOT to consider enhancing the plan. WSDOT project managers are working closely with elected officials and citizens to define a level of landscaping acceptable to the community. Once an agreement is reached the final design will be amended as needed. Extra costs for the enhanced landscaping will be covered by a contingency fund that was included in the original overall project price. The contingency fund was created specifically to cover costs of unanticipated project expenses once the contract was under way.

General Progress Report

Fourteen months have passed since WSDOT issued the September 25, 2002, Notice to Proceed to TNC and Transcore. As of December 2003, TNC has completed 31.5% of the overall project, which includes virtually all project design. Figure 3 below illustrates progress on both design and construction activities.

Figure 3.

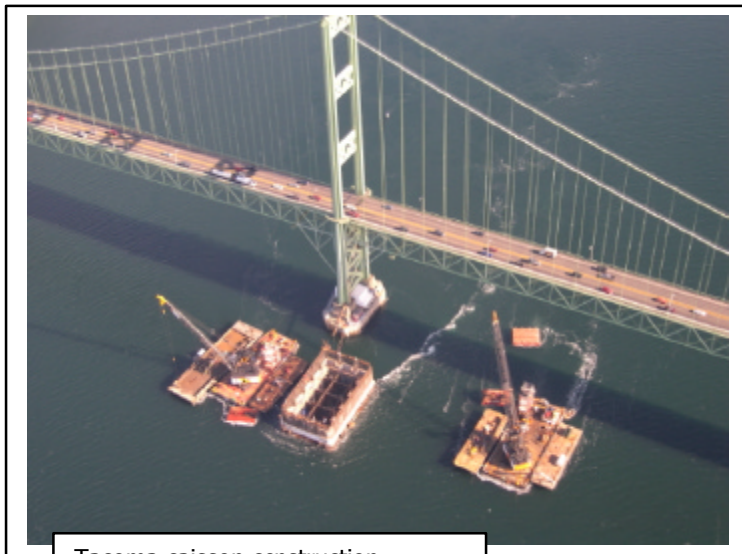
Project Progress to Date: (% Complete)



The percent completion is arrived at through an assignment of budgeted hours to the design and construction with both being weighted. The weighting is distributed as follows: Design contributes 7% toward the physical completion of the project whereas construction contributes 93%. Once the percent of progress is determined based on the budgeted hours, the weight is then applied for a percent of completion.

Progress Report – Marine Work

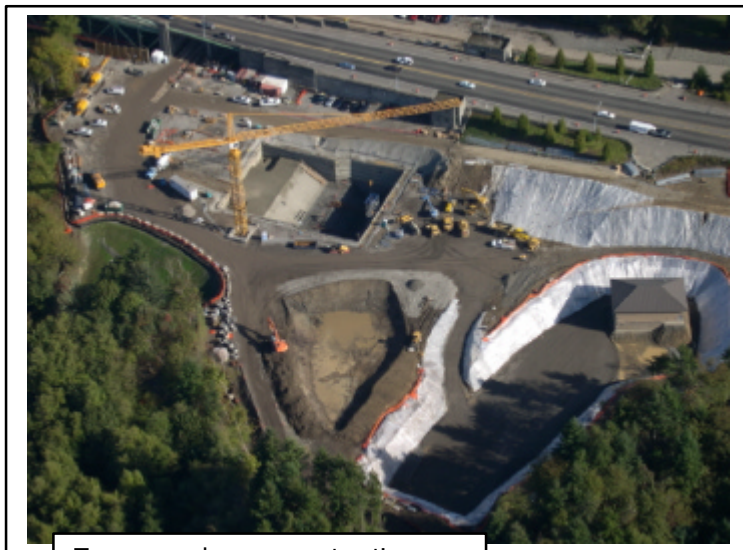
The bridge caissons, or the bridge's foundations, were towed to the Narrows and positioned in July and August 2003. Once the caissons were secured with anchor cables, crews began the “top-



down” construction of the caissons by building concrete-reinforced internal and external walls. As each 10-foot layer of concrete has been placed, the caissons have slowly and methodically descended closer to the Narrows seabed. The Gig Harbor caisson “touched down,” or successfully reached the Narrows seabed, on

December 15, 2003. Its twin Tacoma caisson will reach the seabed in January 2004. Following touchdown, crews will continue to build the caissons' concrete walls and excavate soil out of each of 15 cells that make up their honeycombed structure. Excavating soil from each cell will allow the caissons to continue to sink into the seabed approximately 57-63 feet below ground to their final bottom elevation. At that point, the bottoms of the caissons will be filled with about 25 feet of concrete. The remaining space within the cells will be filled with seawater and the tops of the caissons will be sealed with another 25-foot layer of concrete called the "distribution cap." The distribution cap will eventually support the new bridge's two towers.

At the same time the marine bridgework is occurring, other work is moving forward as well. Two



Tacoma anchorage construction

63-foot-deep anchorages have been excavated from the eastern and western shores. The purpose of the anchorages is to anchor the new bridge's suspension cables. The eastern anchorage is already well under construction, and concrete construction on the western anchorage will begin in early January 2004.

Progress Report – Roadway Work

Improvements to 2 ½ miles of SR 16 are also included in the scope of this project, and major portions of roadwork were accelerated and completed early for the benefit of local residents. A new overpass spanning SR 16 was built at 24th Street NW in Pierce County and was opened to traffic two weeks ahead of schedule, on September 2, 2003. On October 31, 2003, crews opened two new ramps connecting to the new overpass: 1) westbound SR 16 exit to 24th Street NW; and 2) 24th Street NW on-ramp to westbound SR 16. Construction on that on-ramp was accelerated by an entire year at the request of local residents.



Completed 24th Street NW overpass

Two additional ramps tentatively planned to open in the fall are now scheduled to open in January 2004 due to delays in utility relocation and signal installation: 1) 36th Street NW to eastbound SR 16; and 2) eastbound SR 16 exit to 36th Street NW. Simultaneous with those ramp openings will be the opening of a newly

aligned 22nd Street NW. Crews have also completed

many retention ponds to manage storm water runoff, relocated utilities to allow for construction, finished several retaining walls, and have started project landscaping along SR 16 near 36th Street NW.

Cash Flow

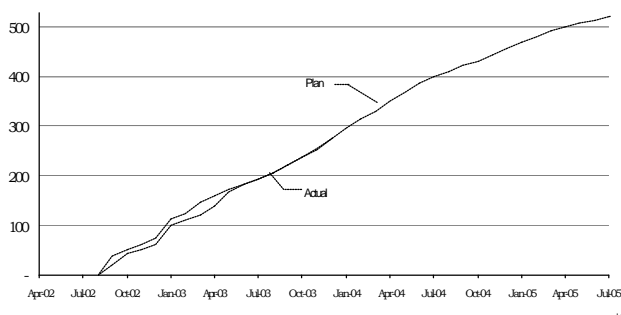
The capital cost for the Tacoma Narrows Bridge project is \$760.4 million. Of that amount, Tacoma Narrows Constructors will receive a fixed price of \$615 million for designing and constructing the project. Transcore, L.P. will receive a fixed price of \$9.2 million for supplying and installing the toll system. In addition, WSDOT has budgeted \$41 million for management and oversight of the project and \$54.7 million for contingencies. Also included in the project capital cost is \$40.5 million for

initial development costs to United Infrastructure of Washington. Table 1 above illustrates budgeted amounts, current expenditures, and planned project cash flow versus actual

Table 1.

<u>Project Cost Summary:</u>	<u>\$Millions</u>	<u>Expended</u>
Design/Build Contract	615.0	266.9
Toll System Contract	9.2	1.2
WSDOT Oversight	41.0	6.4
Contingencies	54.7	4.1
Phase I Dev. Cost (UIW)	40.5	39.9
Total	760.4	318.5
Total Expended/Total Cost	41.8%	

Project Cash Flow: (Through 03-05 Biennium in Millions)



expenditures. Including financing costs and reserve for debt service during construction brings the total project appropriation to \$849 million.

Public Opinion Survey

WSDOT hired DDB Inc., a Seattle-based public relations firm, to conduct a telephone public opinion survey to establish a baseline assessment of public awareness, opinions, and perceptions of the bridge project and of WSDOT. The statistically significant survey sampled 600 random households located within pre-designated geographic areas most likely to be affected by the project, and it was completed in December 2003.

Survey highlights indicated that:

- Virtually all residents surveyed were aware of the Tacoma Narrows Bridge construction project and most residents recalled seeing or hearing news or information about the project.
- Most respondents felt they had been given enough information about the project so far. Among residents wanting more information, the chief topics of interest were project costs, progress updates and information about project benefits.
- One in four respondents had changed travel behavior across the Tacoma Narrows Bridge due to construction, and more than two in five expected to decrease their use of the bridge when tolls were in place.
- Overall, the majority of respondents expressed a favorable opinion of the Tacoma Narrows Bridge construction project. DDB found that the positive ratings were likely due to the fact that over two-thirds of respondents expected the new bridge to improve traffic flow in the area.
- Over half the respondents were at least somewhat satisfied with the WSDOT's performance in specific areas, including informing people.
- In general, residents who lived nearer the bridge were better informed about the project as evidenced by higher recall of news and information and greater recall of project specifics, both positive and negative. Although nearby residents were less positive about the project overall, they express higher levels of satisfaction with WSDOT's performance informing people and in planning and construction.

A copy of the December 2003 executive summary of DDB's findings is available upon request through the Tacoma Narrows Bridge Project Office at (253) 534-4646.

Execution Report

WSDOT is focused on ensuring that the project is delivered within budget and that the contractor delivers a quality product when the project is completed.

Quality Oversight

Quality oversight is another area where design-build methods differ from design-bid-build methods. On a traditional design-bid-build project, WSDOT staff performs both Quality Control and Quality Assurance (QC/QA) tests, which are typical inspection procedures. Quality Control focuses on assuring conformance to design and material specifications and is conducted by WSDOT project inspectors using field tests and documentation of construction procedures. Quality Assurance analyses are performed by independent sources within WSDOT. The Independent Assurance process is intended to verify the procedures of Quality Control.

In the design-build contract, Tacoma Narrows Constructors is responsible for both Quality Control and Quality Assurance with WSDOT performing quality verification. Under the design-build model, it is important for WSDOT to monitor and audit QC and QA activities. To accomplish this task, in July 2003, WSDOT with the assistance of Delcan Incorporated, a global company experienced in construction auditing, began to develop a comprehensive audit program. In the interim of completion of this audit system WSDOT performed several audits of TNC's compliance to quality and testing procedures.

The Compliance Audit System (CAS) combines audits with a materials-testing and verification process. The CAS objectively determines the level of compliance of contract activities and work on a sampling basis. This sampling is independent of TNC's inspection, testing, and acceptance activities.

The CAS uses techniques that focus on two different aspects of the project: 1) construction auditing, which is a documented and systematic review and assessment of TNC's construction quality management techniques and construction products; and 2) management system auditing, which is an evaluation of TNC's management plans and procedures, and to determine whether TNC's quality plan is being implemented. By using the CAS, WSDOT will be able to provide TNC information on the effectiveness of their plans and processes, and thus lower the likelihood that problems about quality will arise.

The CAS program was implemented in September 2003. Since that time, observations indicate that TNC's work is proceeding in compliance with the Design-Build Agreement. Audits conducted to this point have focused on products installed in the field. Future field audits will also include observations of processes that lead to the final product. Once sufficient data are available, auditors will conduct trend analyses.

Contingency Funds

Although design-build contracting generally lowers the owner's risk and reduces project cost growth, there are both planned and unplanned expenditures due to contract changes. A contingency budget was included in the project's original budget to cover such expenditures. Planned and known expenditures include such items as right-of-way settlement costs, removing contaminated soil from the construction site.

Unanticipated changes to the project are driven by various factors, including such things as project scope changes in response to community requests and new permit requirements. The TNB project will have several such changes, such as enhanced project landscaping and adding architectural features to the toll facilities. Other changes to the scope of work are requested by WSDOT to accommodate future maintenance needs, reduce maintenance costs, and accommodate other unanticipated project needs. One of WSDOT's goals is to minimize additions to the project cost while at the same time being a good neighbor and addressing community concerns to the extent possible.

Not all changes increase project costs. Some changes reduce costs and result in project savings. For example TNC initiated a cost reduction proposal that replaced a retaining wall with a standard slope that resulted in net savings of \$62,500 to the project.

Table 2 below shows contingency funds committed as of December 31, 2003.

Table 2. <u>Contingency Funds Committed</u>	<u>Amount</u>
Right-of-Way/Inter-Agency Settlements	\$4,066,000
Planned/ Known Change Orders	\$1,045,578
Community Driven Change Orders	\$221,303
Permit Driven Change Orders	\$389,892
WSDOT Initiated Change Orders	\$317,200
Design-Builder Initiated Change Orders	-\$188,814
Total	\$5,851,159
As of 12/31/03	

Efficiency Report

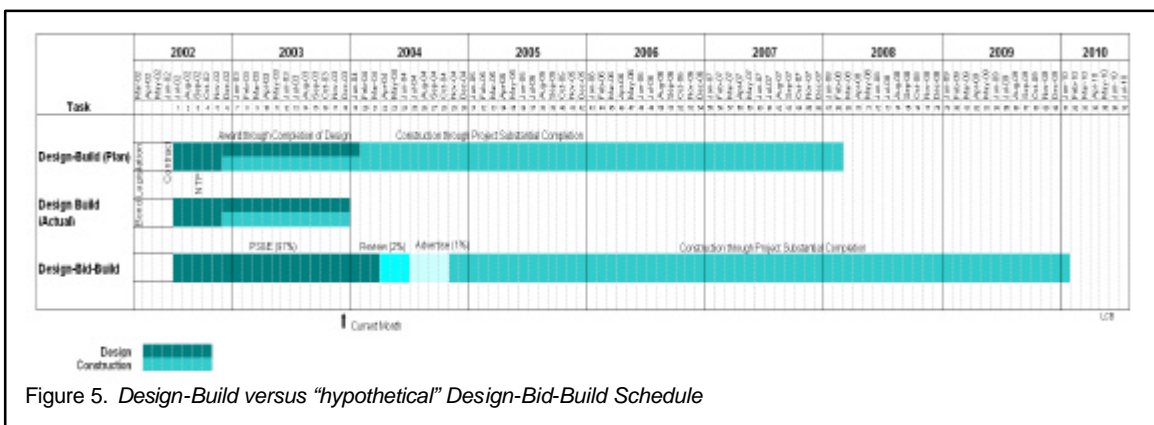
WSDOT has developed three efficiency measures to evaluate the effectiveness of using design-build contracting for this project:

- Schedule comparison to a design-bid-build process;
- Project Management and Oversight budget as a percent of total project capital costs;
- Contingency expenditures as a percent of the total project capital cost.

Schedule Comparison (Design-Bid-Build vs. Design-Build)

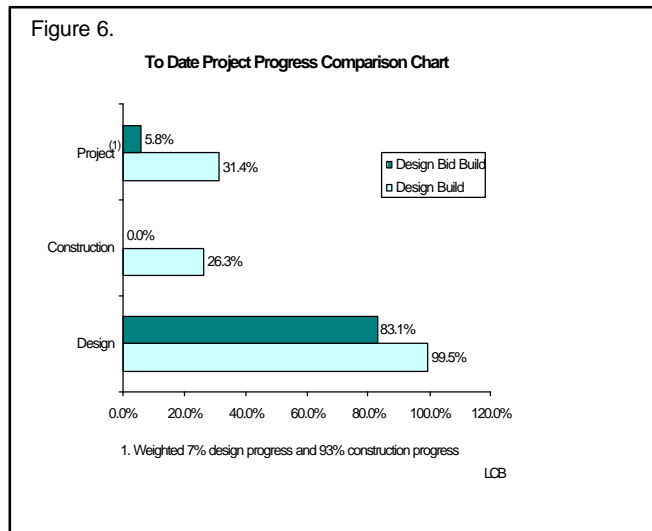
One of the most notable benefits seen in other design-build projects is shortening the project schedule with simultaneous design and construction. The measure here is to compare the traditional WSDOT design-bid-build process to the design-build process and evaluate its performance.

To compare project schedules between design-bid-build and design-build contracting methods, WSDOT developed a likely schedule for a design-bid-build approach to this project. Figure 5 below compares this hypothetical schedule with TNC's actual design-build schedule. It shows that, because of simultaneous design and construction activities, a total project savings of 23-months (representing 25% overall time savings) is projected if TNC realizes its current design-build schedule. Figure 5 also shows that the design-build schedule completes the project design phase two months faster than the design-bid-build schedule. This result is realized in part



because TNC took the risk of proceeding with caisson design prior to completing seismic analyses. If TNC's assumptions had been in error, they would have experienced added work and project delay. This is an example of how placing the risk upon a single entity to execute design and construction can produce timesavings.

As of December 2003, a 25.6% savings in time has been realized. Figure 6 to the right shows a comparison between the actual project progress against projected progress for a design-bid-build approach. Additional timesavings may be realized by TNC as the project progresses, and will be reported on in future reports. This schedule analysis shows that currently the design-build nature of the Tacoma Narrows Bridge project is resulting in an acceleration of approximately 23-months ahead of WSDOT's likely design-bid-build project delivery.

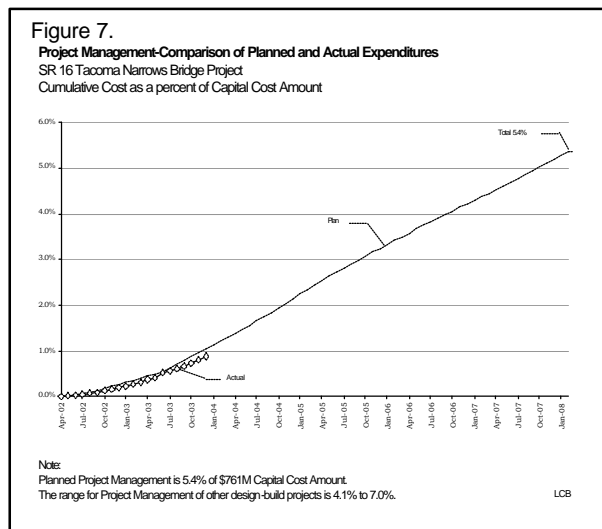


Management & Oversight Budget

Project management and oversight efficiency measure for this project is shown as a percentage of the total project capital costs. However, TNB project management and oversight costs can also be compared to similar design-build projects in other areas. The following three projects were selected for comparison purposes:

- *St. John River Bridge Replacement Project* – I-4 St. Johns River Bridge Replacement project in Florida, partial reconstruction of the US 17-92 Interchange and six laning of I-4 from west of Orange Boulevard to west of Saxon Boulevard including the replacement of the Enterprise Road Bridge. The contract price is approximately \$101 million.
- *Cooper River Bridge Project* – This is a bridge replacement project in South Carolina that is currently around 30% complete. In this project, the design-builder is building a 1,546-foot cable-stay span bridge, the longest in North America. The project spans 2.8 miles and also includes two interchanges, a pedestrian and bicycle facility, and the bridge spanning a shipping channel. The contract price is approximately \$540 million.
- *I-15 Corridor Mega Project* – In this project, the design-builder widened I-15 in Salt Lake City to prepare for the 2002 Winter Olympics. This \$1.38 billion project was completed July of 2001 and included 144 bridge structures.

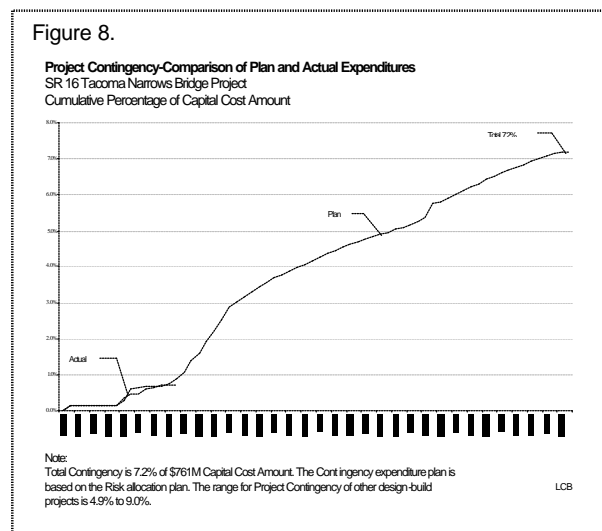
The TNB project management and oversight costs are projected to be 5.4% at project completion. This falls in the middle range of other design-build projects of 4.1% for the I-15 Corridor Mega Project to 7.0% for the Cooper River Bridge Project. Figure 7 shows planned project management and oversight expenditures and actual expenditures spent through December 2003 on the project.



Contingency Budget

A well-planned project contingency fund is an important project management tool. With allocated and planned contingencies in place, an aggressive approach can be taken in managing and controlling unanticipated costs while still meeting the needs of outstanding potential risks to the project.

Project contingency funds for this project are based on a percentage of the total capital cost amount. The ratio of the planned contingency budget (\$54.84 million) to the project's capital cost (\$761 million) provides a means to gauge the efficiency of this project's contingency fund to other design-build contingency funds. Figure 8 shows planned project contingency costs and actual contingency costs through December 2003.



Actual project cost growth on other completed design-build projects range from 4.9% for the I-15 Corridor Mega Project to 9% for the Florida St. John River Bridge Project. On the TNB project, the budgeted contingency fund is currently 7.2% of the total capital cost amount, representing the mid-high end of that range. WSDOT's project contingency fund allows the TNB project managers to aggressively address unanticipated costs (i.e. accommodating community requests,

purchasing additional right-of-way, excavating and disposing of undetected contaminated soils) while still providing a source of funds to meet unexpected construction conditions.

First-Year Lessons Learned

WSDOT and TNC recently celebrated the project's one-year anniversary. WSDOT TNB staff provided a "first year lessons learned" seminar to other WSDOT staff that may be involved in future WSDOT design-build projects. The following list is a brief synopsis of the knowledge transferred:

- Future design-build project management should establish leadership values and objectives prior to the request for proposal (RFP).
- Put together a team of experienced staff knowledgeable in the design-build method or staff that is flexible, open, and can adapt to or develop new processes.
- Develop design-build business processes such as identifying risks, payments and cost control, change orders, and invoicing in the early stages before project execution.
- Involve Region, Headquarters, and specialty support groups in the planning phases of the design-build process.
- Use effective over-the-shoulder reviews through task forces established at the beginning of design phase.
- Have government agency agreements in place up front.
- Co-locate design-builder and WSDOT staff early, preferably at contract execution.
- Communicate expectations and requirements on media relations and public outreach programs.
- Define documentation work product and final records early and involve support offices in the process. Use electronic and digital formats of sharing information between design-builder and WSDOT for more efficient transmittal and review.
- Community involvement processes and expectations should be identified prior to issuing the RFP.
- Provide lessons learned knowledge transfer to other WSDOT staff.

Conclusion

The Legislative Oversight Committee will continue to monitor the progress, execution, and efficiency of the Tacoma Narrows Bridge project. Progress will move forward at a high level of dedication to maintain excellent public outreach and information efforts, address community concerns, refine budgets, and track expenditures. Quality trend analyses will ensure a high level of quality oversight and efforts will be made to limit changes to the project. To further the efficiency of the TNB project under design-build, WSDOT will work with Tacoma Narrows Constructors to pursue additional schedule efficiencies, refine the management and oversight budget, and improve control of cost growth. WSDOT will continue to document and transfer knowledge of lessons learned.